

## **CHAPTER 5**

### **WATER QUALITY PARTNERSHIPS IN THE MISSISSIPPI RIVER WATERSHED**

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**5.1. BACKGROUND.** The Watershed Approach relies on participation at the federal, state, local and nongovernmental levels to be successful. Two types of partnerships are critical to ensure success:

- Partnerships between agencies
- Partnerships between agencies and landowners

This chapter describes both types of partnerships in the Tennessee Portion of the Mississippi River Watershed. The information presented is provided by the agencies and organizations described.

**5.2. FEDERAL PARTNERSHIPS.**

**5.2.A. Natural Resources Conservation Service.** The Natural Resources Conservation Service (NRCS), an agency of the U.S. Department of Agriculture, provides technical assistance, information, and advice to citizens in their efforts to conserve soil, water, plant, animal, and air resources on private lands.

Performance Results System (PRS) is a Web-based database application providing USDA Natural Resources Conservation Service, conservation partners, and the public fast and easy access to accomplishments and progress toward strategies and performance. The PRS may be viewed at <http://prms.nrcs.usda.gov/prs>. From the opening menu, select “Reports” in the top tool bar. You will select the time period that you are interested in and the conservation treatment of interest on the page that comes up. Depending on the time period of interest, you will have various report options to choose from, such as location, reporting period and program involved in the reporting. You may be required to “refresh” the page in order to get the current report to come up.

The data can be used to determine broad distribution trends in service provided to customers by NRCS conservation partnerships. These data do not show sufficient detail to enable evaluation of site-specific conditions (e.g., privately-owned farms and ranches) and are intended to reflect general trends.

<b>Conservation Practice</b>	<b>Feet</b>	<b>Acres</b>
Conservation Buffers	14,279	19
Erosion Control		5,882
Nutrient Management		12,257
Pest Management		12,143
Grazing / Forages		44
Tree and Shrub Practices		7,823
Wetlands		7,048
Tillage and Cropping		19,855
Wildlife Habitat Management		9,943

**Table 5-1. Landowner Conservation Practices in Partnership with NRCS in the Tennessee Portion of the Mississippi River Watershed.** Data are from PRMS for October 1, 2002 through September 30, 2006 reporting period. More information is provided in Appendix V.

**5.2.B. United States Geological Survey – Tennessee Water Science Center Programs.**

The United States Geological Survey (USGS) provides relevant and objective scientific information and data for public use in evaluation of the quantity, quality, and use of the Nation's water resources. National USGS water resource assessments include the National Streamflow Information Program (<http://water.usgs.gov/nsip/>), National Atmospheric Deposition Network (<http://bqs.usgs.gov/acidrain/>), the National Stream Quality Accounting Network (<http://water.usgs.gov/nasqan/>), and the National Water Quality Assessment Program (<http://water.usgs.gov/nawqa/>). For a national overview of USGS water resources programs, please visit <http://water.usgs.gov>.

In addition to national assessments, the USGS also conducts hydrologic investigations and data collection in cooperation with numerous federal, state, and local agencies to address issues of national, regional, and local concern. Hydrologic investigations conducted by the USGS Tennessee Water Science Center address scientific questions pertaining to five general thematic topics:

1. Water Use and Availability,
2. Landforms and Ecology,
3. Watersheds and Land Use,
4. Occurrence, Fate, and Transport of Contaminants, and
5. Floods and Droughts.

In support of these investigations, the USGS Tennessee Water Science Center records streamflow continuously at more than 100 gaging stations, makes instantaneous measurements of streamflow at numerous other locations as needed or requested, monitors groundwater levels statewide, and analyzes the physical, chemical, and biologic characteristics of surface and groundwaters. In addition, the Water Science Center compiles annual water-use records for the State of Tennessee and collects a variety of data in support of national USGS baseline and other networks. More information pertaining to USGS activities in Tennessee can be accessed at <http://tn.water.usgs.gov>.

*USGS Water Resources Information on the Internet.* Real-time and historical streamflow, water-level, and water-quality data at sites operated by the USGS Tennessee Water Science Center can be accessed on-line at <http://waterdata.usgs.gov/tn/nwis/nwis>. Data can be retrieved by county, hydrologic unit code, or major river basin using drop-down menus on the web page. For specific information or questions about USGS streamflow data, contact Donna Flohr at (615)837-4730 or [dfflohr@usgs.gov](mailto:dfflohr@usgs.gov). Recent USGS Tennessee Water Science Center publications can be accessed by visiting <http://tn.water.usgs.gov/pubpg.html>. A searchable bibliographic database is also provided for locating other USGS reports and products addressing specific scientific topics.

**5.2.C. U.S. Fish and Wildlife Service.** The mission of the U.S. Fish and Wildlife Service is working with partners to conserve, protect, and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. Sustaining our nation's fish and wildlife resources is a task that can be accomplished only through the combined efforts of governments, businesses, and private citizens. The U.S. Fish and Wildlife Service (Service) works with state and federal agencies and tribal governments, helps corporate and private landowners conserve habitat, and cooperates with other nations to halt illegal wildlife trade. The Service also administers a Federal Aid Program that distributes funds annually to states for fish and wildlife restoration, boating access, hunter education, and related projects across America. The funds come from Federal excise taxes on fishing, hunting, and boating equipment.

### **Endangered Species Program**

Through the Endangered Species Program, the Service consults with other federal agencies concerning their program activities and their effects on endangered and threatened species. Other Service activities under the Endangered Species Program include the listing of rare species under the Endangered Species Act (ESA) of 1973 (87 Stat. 884, as amended: 16 U.S.C. 1531 et seq.) and the recovery of listed species. Once listed, a species is afforded the full range of protections available under the ESA, including prohibitions on killing, harming or otherwise taking a species. In some instances, species listing can be avoided by the development of Candidate Conservation Agreements, which may remove threats facing the candidate species, and funding efforts such as the Private Stewardship Grant Program.

Recovery is the process by which the decline of an endangered or threatened species is stopped and reversed, and threats to the species' survival are eliminated, so that long-term survival in nature can be ensured. The goal of the recovery process is to restore listed species to a point where they are secure and self-sustaining in the wild and can be removed from the endangered species list. Under the ESA, the Service and National Marine Fisheries Service were delegated the responsibility of carrying out the recovery program for all listed species.

In an effort to preclude the listing of a rare species, the Service engages in proactive conservation efforts for unlisted species. The program covers not only formal candidates but also other rare species that are under threat. Early intervention preserves management options and minimizes the cost of recovery.

Federally endangered (E) and threatened (T) species in the Mississippi River Watershed include the bald eagle (*Haliaeetus leucocephalus*) (T), interior least tern (*Sterna antillarum athalassos*) (E), pallid sturgeon (*Scaphirhynchus albus*) (E), and winged mapleleaf (*Quadrula fragosa*) (E). Since 1996, the Memphis District of U. S. Army Corps of Engineers has hosted annual meetings to discuss dike construction projects in the Mississippi River. The meetings were a result of section 7 consultations with the Service because of the dike's potentially adverse effects to the least tern and pallid sturgeon. The meetings are held to discuss on-going dike construction projects in the river and develop recommendations for modifications to avoid adverse effects to these species. The primary modification is notching the dikes, which maintain river flows in back chutes

that serve as important fish nursery areas in the Mississippi River. Dike notching also keeps sandbars isolated from the riverbanks. To date, the Corps has modified almost 100 dikes. Plans for new proposed dikes include these modifications when possible. Due to maintenance of isolated sandbar nesting habitat, annual counts of least tern colonies on the lower Mississippi River have steadily increased from fewer than 3,000 birds in 1987 to more than 10,000 in 2005. For a complete listing of endangered and threatened species in Tennessee, please visit the Service's website at <http://www.fws.gov/cookeville/>

### **Partners for Fish and Wildlife Program**

The U.S. Fish and Wildlife Service established the Partners for Fish and Wildlife Program to restore historic habitat types that benefit native fishes and wildlife. The program adheres to the concept that restoring or enhancing habitats such as wetlands or other unique habitat types will substantially benefit federal trust species on private lands by providing food and cover or other essential needs. Federal trust species include threatened and endangered species, as well as migratory birds (e.g. waterfowl, wading birds, shorebirds, neotropical migratory songbirds).

Participation is voluntary and various types of projects are available. Projects include livestock exclusion fencing, alternate water supply construction, streambank stabilization, restoration of native vegetation, wetland restoration/enhancement, riparian zone reforestation, and restoration of in-stream aquatic habitats.

### **HOW TO PARTICIPATE...**

- Interested landowners contact a Partners for Fish and Wildlife Biologist to discuss the proposed project and establish a site visit.
- A visit to the site is then used to determine which activities the landowner desires and how those activities will enhance habitat for trust resources. Technical advice on proposed activities is provided by the Service, as appropriate.
- Proposed cost estimates are discussed by the Service and landowner.
- A detailed proposal which describes the proposed activities is developed by the Service biologist and the landowner. Funds are competitive, therefore the proposal is submitted to the Service's Ecosystem team for ranking and then to the Regional Office for funding.
- After funding is approved, the landowner and the Service co-sign a Wildlife Extension Agreement (minimum 10-year duration).
- Project installation begins.
- When the project is completed, the Service reimburses the landowner after receipts

and other documentation are submitted according to the Wildlife Extension Agreement.

For more information regarding the Endangered Species and Partners for Fish and Wildlife programs, please contact the Cookeville Ecological Services Field Office at 931/528-6481 or visit their website at <http://www.fws.gov/cookeville/>

**5.2.D. Unites States Army Corps of Engineers-Memphis District.** Memphis is one of six districts in the Mississippi Valley Division of the Corps of Engineers. The District's area of responsibility encompasses 25,000 square miles, portions of six states, 15 major drainage basins, and approximately 3 million citizens. Responsibilities also include maintaining a 355-mile, 9-foot deep, and 300-foot wide Mississippi River channel from Cairo, Illinois to the mouth of the White River in Arkansas.

The Memphis District serves the Nation by planning, designing, constructing and operating high quality and reasonably priced Civil Works water resource projects, primarily in the major mission areas of flood damage reduction, navigation, and environmental restoration and stewardship. The Corps' ongoing Civil Works responsibilities date back to the early 1800's when Congress authorized the removal of navigation hazards and obstacles in the early years of the nation's development. Over the years, succeeding Administrations and Congresses have expanded the Corps' missions to include most water-related planning, development, and construction areas where a Federal interest is involved. Funds for Civil Works are provided through annual Energy and Water Appropriations Acts and through contributions from non-Federal entities for planning and/or construction of specific projects. All Civil Works projects involve a non-Federal, cost sharing sponsor.

Civil Works projects may also be funded under the Continuing Authorities Program (CAP). Congress has provided the Corps with standing authorities to study and build specific water resource projects for specific purposes and with specified spending limits. The CAP projects are implemented in a faster time frame, are limited in complexity, have Federal cost limits determined by the specific authority, are approved by the Division Commander, and do not need Congressional authorization.

The Memphis District routinely coordinates its navigation mission with the Tennessee Wildlife Resources Agency and the U.S. Fish and Wildlife Service. This consultation has resulted in designing and constructing navigation structures that benefit ecological resources as well as navigation interests in the Lower Mississippi River. These structures include dike notching that allows connectivity of backwater areas with the main stem river and isolates sand bars which increases habitat for the endangered least tern, constructing hard points and multiple round points to increase aquatic diversity, and modifying revetments to allow for macroinvertebrate colonization.

Congress has authorized the Lower Mississippi River Resource Assessment (LMRRA). The study area covers portions of 7 states and 235 counties and parishes. It is made up of river reaches and adjacent floodplains within the Lower Mississippi River alluvial valley (LMRAV) having commercial navigation channels on the Mississippi main stem and tributaries south of Cairo, Illinois, and the Atchafalaya basin floodway system. The

active floodplain encompasses approximately 1.8 million acres; including 1,600 lakes, 145 river side channels and contains the largest natural wetlands in North America. The LMRAV supports 241 species of fish, 50 species of mammals, 45 species of reptiles and amphibians and 37 species of mussels. Scientists estimate that nearly 40% of North America's waterfowl and 60% of all bird species migrate through the river valley. The LMRAV also provides employment opportunities for over 572,000 residents and recreation activities such as boating, hunting, fishing, wildlife viewing and camping. Tourists spend over \$11 billion annually to support the economy of the region. The Lower Mississippi River Resource Assessment (LMRRA) will provide a vehicle for multi-agency collaborative planning and the resultant report to Congress could provide a platform to make recommendations for long-term institutional measures, to forecast data needs, determine recreational demand, explore habitat restoration opportunities, ascertain financial resource needs and influence public policy directives.

To obtain additional information about the District, please refer to the home page at: <http://www.mvm.usace.army.mil>, or contact the following offices:

Public Affairs Office (General Information):	(901) 544-3348
Regulatory Branch:	(901) 544-3473
Planning, Programs, and Project Management Branch:	(901) 544-0658
Continuing Authorities Program:	(901) 544-0798
Environmental Analysis Branch:	(901) 544-3857

### **5.3. STATE PARTNERSHIPS.**

**5.3.A. TDEC Division of Water Supply.** The Source Water Protection Program, authorized by the 1996 Amendments to the Safe Drinking Water Act, outline a comprehensive plan to achieve maximum public health protection. According to the plan, it is essential that every community take these six steps:

- 1) Delineate the drinking water source protection area
- 2) Inventory known and potential sources of contamination within these areas
- 3) Determine the susceptibility of the water supply system to these contaminants
- 4) Notify and involve the public about threats identified in the contaminant source inventory and what they mean to their public water system
- 5) Implement management measures to prevent, reduce or eliminate threats
- 6) Develop contingency planning strategies to deal with water supply contamination or service interruption emergencies (including natural disaster or terrorist activities).

Source water protection has a simple objective: to prevent the pollution of the lakes, rivers, streams, and ground water (wells and springs) that serve as sources of drinking water before they become contaminated. This objective requires locating and addressing potential sources of contamination to these water supplies. There is a growing recognition that effective drinking water system management includes addressing the quality and protection of the water sources.

Source Water Protection has a significant link with the Watershed Management Program goals, objectives and management strategies. Watershed Management looks at the health of the watershed as a whole in areas of discharge permitting, monitoring and protection. That same protection is important to protecting drinking water as well. Communication and coordination with a multitude of agencies is the most critical factor in the success of both Watershed Management and Source Water Protection.

Watershed management plays a role in the protection of both ground water and surface water systems. Watershed Management is particularly important in areas with karst (limestone characterized by solution features such as caves and sinkholes as well as disappearing streams and springs), since the differentiation between ground water and surface water is sometimes nearly impossible. What is surface water can become ground water in the distance of a few feet and vice versa.

Source water protection is not a new concept, but an expansion of existing wellhead protection measures for public water systems relying on ground water to now include surface water. This approach became a national priority, backed by federal funding, when the Safe Drinking Water Act amendments (SDWA) of 1996 were enacted. Under this Act, every public drinking water system in the country is scheduled to receive an assessment of both the sources of potential contamination to its water source of the threat these sources may pose by the year 2003 (extensions were available until 2004). The assessments are intended to enhance the protection of drinking water supplies within existing programs at the federal, state and local levels. Source water

assessments were mandated and funded by Congress. Source water protection will be left up to the individual states and local governments without additional authority from Congress for that progression.

Tennessee's Wellhead Protection Rules were revised as of October 29, 2005 to include requirements for similar protection for public water systems using surface water sources under the heading of Drinking Water Source Protection Rule (1200-5-1-.34) in addition to the previous requirements for wellhead protection for public water systems using ground water sources. The rule addresses surface or ground water withdrawals in the vicinity of public water sources as well as potential contaminant sources threatening public water sources to reflect the amended prohibitions in the 2002 Amendments to the Tennessee Safe Drinking Water Act, TCA 68-221-771. There are additional reporting requirements of potential contaminant source inventories and emergency response for the public water systems as well. The Division of Water Supply will be able to use the Drinking Water Source Protection Rule to work in complimentary fashion with the Division of Water Pollution Control and other Departmental agencies in activities to protect public water sources.

As a part of the Source Water Assessment Program, public water systems are evaluated for their susceptibility to contamination. These individual source water assessments with susceptibility analyses are available to the public at:

<http://www.state.tn.us/environment/dws> as well as other information regarding the Source Water Assessment Program and public water systems.

For further discussion on ground water issues in Tennessee, the reader is referred to the Ground Water Section of the 305(b) Water Quality Report at:

<http://state.tn.us/environment/dws/pdf/2006gw305b.pdf>

**5.3.B. TDEC Clean Water State Revolving Fund Program.** The Division of Water Pollution Control and the Division of Water Supply jointly administer the state's Clean Water State Revolving Fund Program. Amendment of the Federal Clean Water Act in 1987 created the Clean Water State Revolving Fund (SRF) Program to provide low-interest loans to cities, counties, and utility districts for the planning, design, and construction of wastewater facilities. The U.S. Environmental Protection Agency awards annual capitalization grants to fund the program and the State of Tennessee provides a twenty-percent funding match. TDEC has awarded loans totaling over \$675 million since the creation of the SRF Program. SRF loan repayments are returned to the program and used to fund future SRF loans.

SRF loans are available for planning, design, and construction of wastewater facilities, or any combination thereof. Eligible projects include new construction or upgrading/expansion of existing facilities, including wastewater treatment plants, pump stations, force mains, collector sewers, interceptors, elimination of combined sewer overflows, and nonpoint source pollution remedies.

SRF loan applicants must pledge security for loan repayment, agree to adjust user rates as needed to cover debt service and fund depreciation, and maintain financial records that follow governmental accounting standards. SRF loan interest rates range from zero percent to market rate, depending on the community's per-capita income, taxable sales, and taxable property values. Most SRF loan recipients qualify for interest rates between 2 and 4 percent. Interest rates are fixed for the life of the term of the loan. The maximum loan term is 20 years or the design life of the proposed wastewater facility - whichever is shorter.

The SRF Program maintains a Priority Ranking System and Priority List for funding the planning, design, and construction of wastewater facilities. The Priority Ranking List forms the basis for funding eligibility determinations and allocation of Clean Water SRF loans. Each project's priority rank is generated from specific priority ranking criteria and the proposed project is then placed on the Project Priority List. Only projects identified on the Project Priority List may be eligible for SRF loans. The process of being placed on the Project Priority List must be initiated by a written request from the potential SRF loan recipient or their engineering consultant. SRF loans are awarded to the highest priority projects that have met SRF technical, financial, and administrative requirements and are ready to proceed.

Since SRF loans include federal funds, each project requires development of a Facilities Plan, an environmental review, opportunities for minority and women business participation, a State-approved sewer use ordinance and Plan of Operation, and interim construction inspections.

For further information about Tennessee's Clean Water SRF Loan Program, contact the Clean Water SRF Loan Program by telephone at (615) 532-0445 or visit their Web site at <http://tennessee.gov/environment/srf>.

**5.3.C. Tennessee Department of Agriculture.** The Tennessee Department of Agriculture's Water Resources Section administers the federal Section 319 Nonpoint Source Program and the Agricultural Resources Conservation Fund Program. Both of these are grant programs which award funds to various agencies, non-profit organizations, and universities that undertake projects to improve the quality of Tennessee's waters and/or educate citizens about the many problems and solutions to water pollution. Both programs fund projects associated with what is commonly known as "nonpoint source pollution."

The Tennessee Department of Agriculture's Nonpoint Source Program (TDA-NPS) has the responsibility for management of the federal Nonpoint Source Program, funded by the US Environmental Protection Agency through the authority of Section 319 of the Clean Water Act. This program was created in 1987 as part of the reauthorization of the Clean Water Act, and it established funding for states, territories and Indian tribes to address NPS pollution. Nonpoint source funding is used for installing Best Management Practices (BMPs) to stop known sources of NPS pollution, training, education, demonstrations and water quality monitoring. The TDA-NPS Program is a non-regulatory program, promoting voluntary, incentive-based solutions to NPS problems. The TDA-NPS Program basically funds three types of programs:

- **BMP Implementation Projects.** These projects aid in the improvement of an impaired waterbody, or prevent a non-impaired water from becoming listed on the 303(d) List.
- **Monitoring Projects.** Up to 20% of the available grant funds are used to assist the water quality monitoring efforts in Tennessee streams, both in the state's 5-year watershed monitoring program, and also in performing before-and-after BMP installation, so that water quality improvements can be verified. Some monitoring in the Tennessee portion of the Mississippi River Watershed was funded under an agreement with the Tennessee Department of Agriculture, Nonpoint Source Program (U.S. Environmental Protection Agency Assistance Agreement C99944674-04-0 and C99944674-05-0 ).
- **Educational Projects.** The intent of educational projects funded through TDA-NPS is to raise the awareness of landowners and other citizens about practical actions that can be taken to eliminate nonpoint sources of pollution to the waters of Tennessee.

The Tennessee Department of Agriculture Agricultural Resources Conservation Fund Program (TDA-ARCF) provides cost-share assistance to landowners across Tennessee to install BMPs that eliminate agricultural nonpoint source pollution. This assistance is provided through Soil Conservation Districts, Resource Conservation and Development Districts, Watershed Districts, universities, and other groups. Additionally, a portion of the TDA-ARCF is used to implement information and education projects statewide, with the focus on landowners, producers, and managers of Tennessee farms and forests.

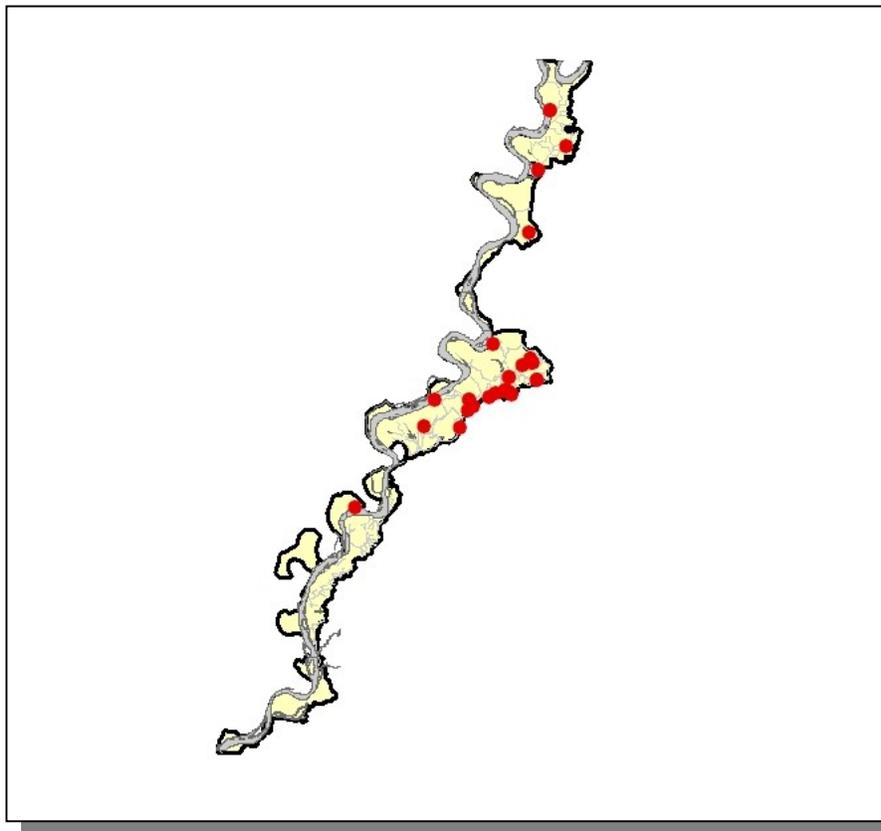
Participating contractors in the program are encouraged to develop a watershed emphasis for their individual areas of responsibility, focusing on waters listed on the Tennessee 303(d) List as being impaired by agriculture. Current guidelines for the TDA-ARCF are available. Landowners can receive up to 75% of the cost of the BMP as a reimbursement.

Since January of 1999, the Department of Agriculture and the Department of Environment and Conservation have had a Memorandum of Agreement whereby complaints received by TDEC concerning agriculture or silviculture projects would be forwarded to TDA for investigation and possible correction. Should TDA be unable to obtain correction, they would assist TDEC in the enforcement against the violator. More information forestry BMPs is available at:

<http://www.state.tn.us/agriculture/forestry/bmpmanual.html>

The complaint form is available at:

[http://www.state.tn.us/environment/wpc/forms/wqlogging\\_cn1274.doc](http://www.state.tn.us/environment/wpc/forms/wqlogging_cn1274.doc)



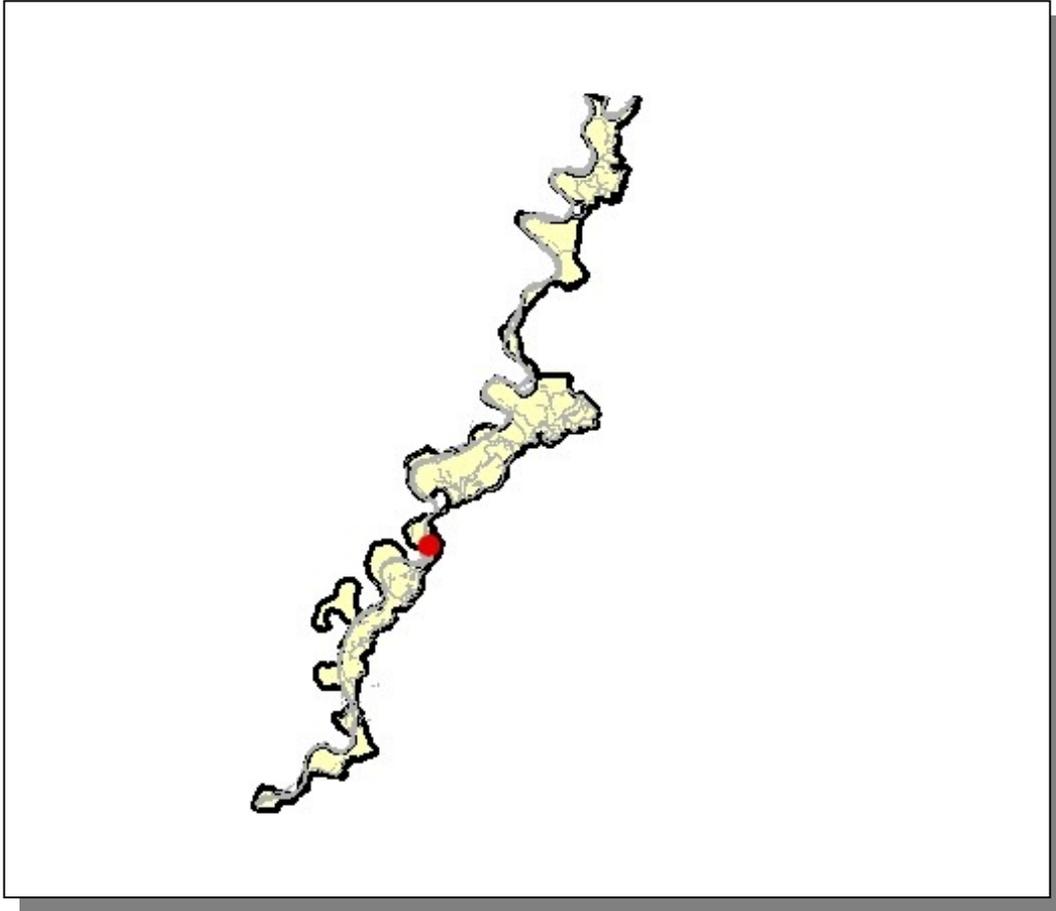
**Figure 5-5. Location of BMPs installed from 2002 through 2006 in the Tennessee Portion of the Mississippi River Watershed with Financial Assistance from the Tennessee Department of Agriculture's Nonpoint Source and Agricultural Resources Conservation Fund Grant Programs. More information is provided in Appendix V.**

**5.3.D. Tennessee Wildlife Resources Agency.** The Tennessee Wildlife Resources Agency (TWRA) conducts a variety of activities related to watershed conservation and management. Fish management activities include documentation of fish and aquatic life through stream sampling and stocking of both warm water and cold-water sport fish. Fish data are managed in the Geographic Information System (GIS) project called Tennessee Aquatic Database System (TADS). TWRA nongame and endangered species projects include restoration of special status fish, aquatic life, and riparian wildlife. The Agency conducts a variety of freshwater mussel management, conservation, and restoration projects including the propagation and reintroduction of species once common in Tennessee streams. TWRA has been involved in riparian conservation projects since 1991 in partnership with state and federal agencies and conservation groups.

#### **The Tennessee Aquatic Database System (TADS)**

The Tennessee Aquatic Database System (TADS) originated in the mid-1980's as a geographically referenced fisheries database maintained on ESRI's GIS Arc/Info software. It consists of mapping coverages of streams, rivers and reservoirs along with related fisheries data files. These database files include stream and river fish distributions, sample site data, and Index of Biotic Integrity (IBI) data. The fish inventory data file contains over 15,000 records of fish occurrences from over 3,600 sample sites across the state. Fish data is referenced by river reach and a point coverage generated by latitude and longitude. Physical and chemical data and habitat evaluations from most of the sample sites have been entered into a database.

TWRA Fisheries stream survey data were consolidated, updated and entered into a Microsoft Access database to create the Tennessee Aquatic Database System 07 (TADS07), an updated version of the TADS. TADS07 contains fisheries stream survey data from 1987 to 2005.



**Figure 5-9. Location of TWRA TADS Sampling Sites in the Tennessee Portion of the Mississippi River Watershed from 1987-2005.** More information is provided in Appendix V.

### **Tennessee State Wildlife Action Plan (SWAP)**

The Tennessee State Wildlife Action Plan (SWAP), formerly known as the Comprehensive Wildlife Conservation Strategy (CWCS), was developed by the Tennessee Wildlife Resources Agency with assistance from The Nature Conservancy in 2005. Congress mandated that each state and territory in the United States develop a SWAP as a requirement for continued receipt of federal State Wildlife Grant funding. These plans require the completion of 8 key elements of wildlife planning: 1) a list of animal species of greatest conservation need, 2) information about the distribution and abundance of species targets, 3) locations and relative conditions of key habitats, 4) descriptions of problems affecting target species and their habitats, 5) descriptions of conservation actions and priorities for conserving target species and habitats, 6) details for monitoring target species, conservation actions, and adaptive management, 7) discussion of plans to review the SWAP at specific intervals, and 8) information about coordination and implementation of the SWAP with major stakeholders. In Tennessee, the SWAP was integrated into a spatial model using Geographic Information Systems (GIS) and other database technology. Priority aquatic, terrestrial, and subterranean

areas for conservation were identified across the state. Priorities were determined in the GIS model based upon relative differences in species rarity, population viability, and potential mobility of species across habitat units.

Priority problems affecting species and needed conservation actions are detailed across each region of the state. For complete information about the Tennessee SWAP, please visit: <http://www.state.tn.us/twra/cwcs/cwcsindex.html> to read or download the full report.

For information on these and other water resources related activities, please contact your Regional TWRA office at the following phone numbers:

West Tennessee ( Region I )	1-800-372-3928
Middle Tennessee ( Region II )	1-800-624-7406
Cumberland Plateau ( Region III )	1-800-262-6704
East Tennessee ( Region IV )	1-800-332-0900

TDD services are available at 615-781-6691.

TWRA's website is <http://www.state.tn.us/twra>.

**5.3.E. West Tennessee River Basin Authority.** The West Tennessee River Basin Authority, an agency of the Department of Environment and Conservation, is responsible for the preservation of the natural flow and function of rivers and streams in the Forked Deer, Obion and Mississippi River Basins. As a Water Quality Partner, the Basin Authority conducts a variety of activities directly related to the conservation of resources in these river basins. In carrying out its mission the Basin Authority:

- Pursues and implements meandering stream and river restoration projects, with the goal of restoring natural floodplain dynamics and the associated riverine ecosystems.
- Implements watershed level projects designed to reduce the volume of sediment entering streams, and rivers. Excessive sedimentation can severely impair water quality as well as aquatic and floodplain habitats.
- Performs environmentally sensitive removal of logjams and obstructions to flow in streams and rivers, resulting in the preservation of environmental and economic resources.
- Maintains 120 Flood Control and Sediment Retention Structures, designed to increase flood storage capacity and to improve water quality through removal of suspended sediments.
- In support of its work, receives donations of Conservation Easements on Bottomland Hardwood Timber and other Wetlands. To date, over 23 square miles have been donated to the Basin Authority by private landowners.
- Maintains several large Bank Stabilization Projects, designed to prevent severe bank erosion. Where feasible, the Basin Authority utilizes bioengineering techniques to stabilize river banks, while, at the same time, reestablishing the riparian corridor.
- Maintains several Grade Control Structures designed to prevent further vertical degradation of altered streams and rivers. These structures, not only protect

vital infrastructure, but also help prevent the release of large volumes of sediment.

Through its efforts, the West Tennessee River Basin Authority will remain a strong advocate for the conservation and sustainable utilization of the resources within the Mississippi, Obion and Forked Deer River Basins.

The West Tennessee River Basin Authority office is located at 3628 East End Drive in Humboldt, Tennessee. For additional information or assistance, call 731/784-8173.

**5.3.F. Kentucky Division of Water** The Kentucky Watershed Management Framework is a dynamic, flexible structure for coordinating watershed management across the Commonwealth of Kentucky.

The Watershed Management Framework is not a new program, but rather a way of coordinating existing programs and building new partnerships that will result in more effective and efficient management of the state's land and water resources. Inherent in the design of the Framework is the belief that many stakeholder groups and individuals must have ongoing opportunities to participate in the process of managing the abundant natural resources that characterize Kentucky's watersheds.

Benefits to the people of Kentucky include:

- Better information for decision making
- Increased ability to resolve complex water resource problems
- Improved coordination among governmental agencies
- More opportunities for citizens to get involved
- Increased ability to demonstrate results and benefits of environmental management
- More cost-effective use of public and private funds

Each major river basin in Kentucky is staffed with a Basin Coordinator. Basin Coordinators are staff assigned to serve as a liaison in a given basin management unit among the agencies, the local interests, and the resources concerns. Their job is to specialize in their watershed, to know what resources might be available to address the concerns, and facilitate the watershed process to implement plans that address the problems.

For more information about the KY Watershed Management Framework visit our website at <http://www.watersheds.ky.gov/>

Watershed Framework activities in Red River watershed are coordinated through the Four Rivers Basin Team. The Four River Basin Team is a multi-agency task force that meets regularly to help in development of monitoring strategies, education and outreach, prioritization of issues and watersheds within the basin, planning, and networking among technical staff and local leaders to apply agency resources to implement fixes. For more info about the Four Rivers Basin Team contact Janet Miller, Four Rivers Basin Coordinator at (270)270-933-1317 or via email at [janet.miller@jpf.org](mailto:janet.miller@jpf.org). The web address is: [http://www.watersheds.ky.gov/basins/four\\_rivers/](http://www.watersheds.ky.gov/basins/four_rivers/)

## **Mississippi River (08010100)**

Hazel Creek (08010100010)

Shawnee Creek (08010100020)

Mississippi River/Kentucky Bend (08010100050)

Mississippi River, below Hickman (08010100040)

Mississippi River, below Sandy Branch (08010100030)

### ***Geography***

These subwatersheds represent three segments of the Mississippi River main stem from the mouth of Mayfield Creek to the Tennessee state line, as well as two significant tributaries: Hazel Creek and Shawnee Creek. Three other large tributaries, Obion Creek, Mayfield Creek and Bayou de Chien are separate hydrologic units not discussed.

The watershed boundaries along the Mississippi main stem are occasionally very narrow with river bottomlands rising quickly along steep slopes or bluffs to narrow ridge tops. A flood levee represents the eastern boundary of the watershed from Hickman downstream into Tennessee. An isolated portion of land known as Kentucky Bend is located in this watershed.

Hazel Creek is a small stream that arises in western Ballard County and flows westward into the Axe Lake wetlands. Along Hazel Creek the valley is narrow and rises gradually to broader ridges and rolling plains. Once the stream reaches Axe Lake the terrain becomes an area of rolling bottomland known as Barlow Bottoms.

Shawnee Creek arises in western Ballard County and flows westward into Fish Lake. Along Shawnee Creek the valley is fairly narrow and rises to narrow ridges. Just before the stream reaches Fish Lake the terrain drops along a steep river terrace and becomes an area of rolling bottomland known as Barlow Bottoms. The terrace height ranges from 40 feet near Barlow to over 150 feet near Wickliffe. Terrain around the Buzzard Creek and Cane Creek is more rugged with steeper slopes rising 50-100 feet to narrow ridges.

### ***Waterways***

These watersheds drain about 185 square miles and contain about 226 total stream/lake miles. A 2.0-mile segment of the Mississippi River in the upper portion of the segment is Outstanding Resource Water.

There are a number of lakes and significant wetlands in the watershed including: Axe Lake, Minor Lake, Grassy Lake, First Lake, Clear Pond, Crooked Lake, Indian Camp Lake, Fish Lake, Black Lake, Clear Lake, Swan Pond, Hunters Pond, Lost Pond, and Twin Pond. Swan Pond is Outstanding Resource Water.

Obion Creek, Mayfield Creek and Bayou de Chien are major tributaries in this watershed but are discussed as a separate hydrologic unit. Sandy Branch is the only other significant tributary in this watershed. There are 5 KPDES permits recorded for this watershed; including wastewater treatment facilities at Columbus and Barlow.

***Land cover/land use***

Land out of the floodplain is used predominately for row crop agriculture as well as poultry and swine production. Lands near the Mississippi River are also used for row crop agriculture and for tree plantations. Around Axe Lake and many of the sloughs are significant wetlands that remain mostly forested. Much of the wetland areas are part of the Barlow Bottoms and Westvaco Wildlife Management Areas.

***Agency Data Assessment***

During the 2000 water quality assessment a 3.7-mile segment of Hazel Creek was assessed from the Axe Lake wetland ponds upstream to an unnamed tributary. The segment was assessed for fish and was judged not supporting for aquatic life. An aquatic habitat survey for the segment yielded a score in the not supporting range due to poor bank stability and heavy sediment deposition.

Shawnee Creek Slough was assessed in three segments for a total of 13.0 miles. A 3.0-mile segment from Twin Lake to Fish Lake was assessed for water quality and fecal coliform bacteria. The segment was judged fully supporting for primary contact recreation but not supporting for aquatic life. A 1.0-mile segment upstream of Fish Lake was also assessed for water quality and fecal coliform bacteria. The segment was judged partially supporting for aquatic life and primary contact recreation. The next 9.0 miles were assessed for fish, macroinvertebrates, and algae. The segment was judged partially supporting for aquatic life.

The lower 3.8 miles of Cane Creek were assessed for fish and were judged partially supporting for aquatic life.

Swan Pond was also assessed as part of the Clean Lakes Program. The waterbody was judged to be not supporting for aquatic life due to low dissolved oxygen levels. The suspected cause of this impairment is agriculture and natural sources.

***Watershed Efforts in the Mississippi River***

The Wetland Reserve Program (WRP) dominates water protection efforts in the Mississippi River watershed. According to USDA Natural Resources Conservation Service (NRCS), the Wetlands Reserve Program is a voluntary program that offers landowners an opportunity to establish long-term conservation and wildlife practices and protection. NRCS provides technical and financial support to help landowners with their wetland restoration efforts. Efforts involve the restoration of hydrologic functions and tree planting. The goal is to achieve the greatest wetland functions and values, along with optimum wildlife habitat, on every acre enrolled in the program.

In the KY bend, 1,774 acres are permanently enrolled in WRP. Acreage in the Mississippi River watershed below Hickman and below Sandy Branch in Fulton County is permanently enrolled as well. Additionally, acreage in the Hazel Creek and Shawnee Creek sub-watersheds in western Ballard County is enrolled in WRP in perpetuity.

#### **5.4. LOCAL INITIATIVES.**

**5.4.A. Friends of West TN Refuges.** The Friends of West TN Refuges is a non-profit organization designed to help the refuges of Tennessee through fundraising and volunteer work. Their mission is to promote and enhance the integrity of the West Tennessee National Wildlife Refuges through activities that advance public understanding, awareness, appreciation, and enjoyment of the natural environment. Their goals are to support refuge activities and events, increase awareness of West Tennessee Refuges, educate the public about The U.S. Fish & Wildlife Service's mission, and to increase fundraising to support refuge programs. They have achieved funding for our Backyard Habitat, Junior Ranger Program, water delivery systems, and 3 observation towers.

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